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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/735,771	12/16/2003	Akihisa Hongo	2003_1822A	4044

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EXAMINER	
MACARTHUR, SYLVIA	

ART UNIT	PAPER NUMBER
1763	

DATE MAILED: 12/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/735,771	HONGO ET AL.	
	Examiner	Art Unit	
	Sylvia R. MacArthur	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 November 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *10-15 and 20-33* is/are pending in the application.

4a) Of the above claim(s) *10-15* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *20-33* is/are rejected.

7)☒ Claim(s) *33* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 May 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see pages 6-8, filed 11/9/2006, with respect to claims 22 and 26 have been fully considered and are persuasive. The finality of the previous action has been withdrawn.

2. Furthermore, applicant amended claim 20 to recite that the ultrasonic transducer of the present invention collapses micro-bubbles. The examiner takes the position that ultrasonic transducers inherently perform this function as evidenced by an excerpt on *Cavitation* by Wikipedia. Cavitation is employed in ultrasonic cleaning baths wherein bubbles are formed and collapse due to the ultrasonic transducer and the energy it produces. Also, the prior of Skrovan et al (US 6,048,405) col. 1 lines 38-49 teaches that ultrasonic transducers form micro-bubbles in the cleaning solution and the bubbles are collapsed by the pressure of the ultrasonic agitation. Thus, ultrasonic transducers perform the function of generating micro-bubbles, collapsing micro-bubbles, and emitting ultrasonic waves. McDermott et al (US 2004/0055621) teaches in [0148] that ultrasonic energy uses cavitation (bubble formation and collapsing) to enhance cleaning of wafers. Redeker et al (US 2003/0041879) teaches transducer 39 (generator of the sonic energy) causes bubbles to form and collapse within the fluid. This forming and collapsing of the bubbles gently scrubs the surface of the wafer according to [0030]. In essence, Redeker et al teaches that the ultrasonic transducer is a micro-bubble generator and collapses the bubbles that it forms.

Claim Objections

3. Claims 33 is objected to under 37 CFR 1.75 as being a substantial duplicate of claim 30. When two claims in an application are duplicates or else are so close in content that they both

cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 20 and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Miyashita et al (US 4,980,300).

Miyashita et al teaches a substrate processing apparatus.

Regarding claim 20: Miyashita teaches that the processing apparatus comprises a processing liquid supply section (this inherently exists though not shown as it is discussed in col. 2 lines 51-55), a micro-bubble generator (gas sprayer 17) and an ultrasonic transducer 12. Collapsing of the bubbles occurs according to col. 3 lines 34-37.

Regarding claim 22: The micro-bubble generator comprises a gas diffuser (gas supply tube 16 and spray nozzle 17) is discussed in the paragraph that joins col. 2 and 3.

2. Claims 20, 23, and 24 are rejected under 35 U.S.C. 102(b) as being anticipated by Miyashita et al (US 4,980,300) as evidenced by Redeker et al (US 2003/0041879).

Regarding claim 20: Fig. 3 (a different embodiment) of Miyashita et al illustrates a process liquid supply section 25 and ultrasonic transducer 23 (that includes 24 and 24A).

Though, Miyashita et al does not specifically recite a micro-bubble generator, the examiner takes the position that the ultrasonic transducer performs dual functions and actions as both an emitter of ultrasonic waves and a micro-bubble generator as evidenced by Redeker et al.

Redeker et al teaches cleaning a wafer using a sonically energized rinsing fluid, see abstract. According to Redeker et al, transducer 39 (generator of the sonic energy) causes bubbles to form and collapse within the fluid. This forming and collapsing of the bubbles gently scrubs the surface of the wafer according to [0030]. In essence, Redeker et al teaches that the ultrasonic transducer is a micro-bubble generator and collapses the bubbles that it forms. Thus, Redeker et al provides evidence that the ultrasonic generator is also a micro-bubble generator.

Regarding claim 23: Miyashita et al teaches a substrate holder (table 20), a rotating mechanism (rotation driver 22) rotates the table, and the ultrasonic tranduscer 24 faces the substrate 21 when held by the table.

Regarding claim 24: See Fig. 3.

6. Claims 20, 23, 24, 26, and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Miyazaki et al (US 6,352,469) as evidenced by Redeker et al (US 2003/0041879).

Miyazaki et al teaches a polishing apparatus with slurry screening.

Regarding claim 20: Miyazaki et al teaches a processing liquid supply (line 8) and an ultrasonic transducer 50. Though, Miyazaki et al does not specifically recite a micro-bubble generator in the embodiment illustrated in Fig. 1, the examiner takes the position that the ultrasonic transducer performs dual functions and actions as both an emitter of ultrasonic waves and a micro-bubble generator as evidenced by Redeker et al.

Redeker et al teaches cleaning a wafer using a sonically energized rinsing fluid, see abstract. According to Redeker et al, transducer 39 (generator of the sonic energy) causes bubbles to form and collapse within the fluid. This forming and collapsing of the bubbles gently scrubs the surface of the wafer according to [0030]. In essence, Redeker et al teaches that the ultrasonic transducer is a micro-bubble generator and collapses the bubbles that it forms. Thus, Redeker et al provides evidence that the ultrasonic generator is also a micro-bubble generator.

Regarding claims 23 and 24: See Fig. 1.

Regarding claim 26: Miyazaki et al teaches a substrate holder 24 that holds and rotates the substrate. A rotary plate 28 is opposite the front surface of the substrate. Fig. 1 illustrates the rotary plate is arranged at a distance from the substrate so as to form a circular processing space therebetween and a first fluid supply section wherein the fluid is delivered by line 8.

Regarding claim 28: The type of fluid supplied by line 8 slurry 3 is inherently capable of performing etching as CMP is a form of etching.

7. Claims 26-33 are rejected under 35 U.S.C. 102(b) as being anticipated by Sato et al (US 4,968,375).

Sata et al teaches an etching apparatus.

Regarding claim 26: The apparatus of Sato comprises a substrate holder (vacuum chuck 11), a rotary plate 31. Fig. 2A illustrates that the rotary plate is disposed opposite the front surface of the substrate when held by the holder 11 the rotary plate 31 is further arranged at a distance from the substrate when by the holder so as to form a circular processing space therebetween; and a first fluid supply section (41).

Regarding claim 27: Col. 6 lines 35-45 teaches that the chucks 11 and 31 rotate in opposite directions.

Regarding claim 28: Col. 5 lines 53-65 teaches that cleaning (etching) solution is dispersed from nozzles 42 and 43.

Regarding claim 29: Sato et al further teaches a counter plate (etching mechanism 21) with a second fluid supply section 23.

Regarding claims 30 and 33: Fig. 2A depicts that the counter plate is rotatable.

Regarding claim 31: Fig. 2A further illustrates that the counter plate rotates in a different direction than chuck 11.

Regarding claim 32: Sato et al teaches that 23 dispenses etching solution in col. 5 lines 15-20.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 21 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyashita et al (US 4,980,300) or Miyashita et al (US 4,980,300) as evidenced by Redeker et al (US 2003/0041879), in view of Skrovan et al (US 6,48,405).

The teachings of Miyashita et al alone (Fig.1) or Miyashita as evidenced by Redeker et al were discussed above.

Regarding claim 21: Miyashita et al fails to teach the size of bubble produced by the gas sprayer in Fig. 1 or the ultrasonic transducer in Fig.3 and fails to teach the process pressure. The claims of the present invention are held to an apparatus. According to In re Aller, 220 F. 2d 454, 456, 105 USPQ 233,235 (CCPA 1955), where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to have determined the optimum values of the relevant process parameters through routine experimentation in the absence of a showing of criticality.

Regarding claim 25: Miyashita fails to teach that the frequency of the transducer is within the recited range. Skrovan et al teaches the use of transducers to clean substrates. Skrovan et al teaches high frequency such as 0.2 to 5.0 MHz. The motivation to clean the substrates of Miyashita using a transducer within the range of 0.2 – 5.0 MHz offers Skrovan et al results in improved, gentler cleaning without damaging the cleaning operations, see col. 1 lines 50-59. Thus, it would have been obvious to use transducers within the range recited by claim 21 as it provides an improved gentler cleaning. Also, note that range of frequency for the transducer used in either embodiment of Miyashita et al is a matter of optimization. The frequency at which the transducer oscillates maximizes the particle removal efficiency. It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to have determined the optimum value of a cause effective variable such the transducer frequency through routine experimentation in the absence of a showing of criticality. In re Woodruff, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

10. Claims 21 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyazaki et al (US 6,352,469) as evidenced by Redeker et al (US 2003/0041879), in view of Skrovan et al (US 6,48,405).

The teachings of Miyazaki et al (US 6,352,469), Fig.1 as evidenced by Redeker et al (US 2003/0041879)were discussed above.

Regarding claim 21: Miyashita et al fails to teach the size of bubble produced by the ultrasonic transducer. The claims of the present invention are held to an apparatus. According to In re Aller, 220 F. 2d 454, 456, 105 USPQ 233,235 (CCPA 1955), where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to have determined the optimum values of the relevant process parameters through routine experimentation in the absence of a showing of criticality.

Regarding claim 25: Miyashita fails to teach that the frequency of the transducer is within the recited range. Skrovan et al teaches the use of transducers to clean substrates. Skrovan et al teaches high frequency such as 0.2 to 5.0 MHz. The motivation to clean the substrates of Miyashita using a transducer within the range of 0.2 – 5.0 MHz offers Skrovan et al results in improved, gentler cleaning without damaging the cleaning operations, see col. 1 lines 50-59. Thus, it would have been obvious to use transducers within the range recited by claim 21 as it provides an improved gentler cleaning. Also, note that range of frequency for the transducer used in either embodiment of Miyashita et al is a matter of optimization. The frequency at which the transducer oscillates maximizes

the particle removal efficiency. It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to have determined the optimum value of a cause effective variable such the transducer frequency through routine experimentation in the absence of a showing of criticality. In re Woodruff, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sylvia R. MacArthur whose telephone number is 571-272-1438. The examiner can normally be reached on M-F during the hours of 8:30 a.m. and 5 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on 571-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Sylvia R MacArthur
Patent Examiner
Art Unit 1763

December 7, 2006